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International application number: PCT/US05/004522

International filing date: 14 February 2005 (14.02.2005)

Document type: Certified copy of priority document

Document details: Country/Office: US
Number: 60/544,010
Filing date: 12 February 2004 (12.02.2004)

Date of receipt at the International Bureau: 14 March 2005 (14.03.2005)

Remark: Priority document submitted or transmitted to the International Bureau in compliance with Rule 17.1(a) or (b)

1292036

THE UNITED STATES OF AMERICA

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United States Patent and Trademark Office

March 03, 2005

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APPLICATION NUMBER: *60/544,010*
FILING DATE: *February 12, 2004*
RELATED PCT APPLICATION NUMBER: *PCT/US05/04522*

Certified by

Jon W. Dudas

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PROVISIONAL APPLICATION FOR PATENT COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No.	ER873481614US

INVENTOR(S)

Given Name (first and middle [if any])	Family Name or Surname	Residence (City and either State or Foreign Country)
Darrell H.	Reneker	300 Hampshire Rd., Akron, OH 44313
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Woraphon	Kataphinan	805 Yale St., #B, Akron, OH 44311

☐ *Additional inventors are being named on the _____ separately numbered sheets attached hereto*

TITLE OF THE INVENTION (500 characters max)

STENT COATING

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☑ Specification *Number of Pages* 9 ☐ CD(s), Number _____

☐ Drawing(s) *Number of Sheets* _____ ☑ Other (specify) postcard

☐ Application Data Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT

☑ Applicant claims small entity status. See 37 CFR 1.27.

☐ A check or money order is enclosed to cover the filing fees

☑ The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 50-0959

☐ Payment by credit card. Form PTO-2038 is attached.

FILING FEE AMOUNT ($): $80.00

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☑ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE Daniel J. Schlue, Esq.

TYPED or PRINTED NAME Daniel J. Schlue

TELEPHONE 330-376-2700

Date 02/12/2004

REGISTRATION NO. *(if appropriate)* 52,194

Docket Number: 089498-0489

USE ONLY FOR FILING A PROVISIONAL APPLICATION FOR PATENT

This collection of information is required by 37 CFR 1.51. The information is used by the public to file (and by the PTO to process) a provisional application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 8 hours to complete, including gathering, preparing, and submitting the complete provisional application to the PTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Washington, D.C. 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Box Provisional Application, Assistant Commissioner for Patents, Washington, D.C. 20231.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In the application of)
)
DARRELL RENEKER et al.)
)
Serial No.)
)
Filed)
)
For STENT COATING)
)

CERTIFICATE OF MAILING VIA EXPRESS MAIL

I hereby certify that this correspondence was deposited with the United States Postal Service as Express Mail addressed to: Mail Stop PROVISIONAL PATENT APPLICATION, Commissioner for Patents, P. O. Box 1450, Alexandria, VA 22313-1450, on February 12, 2004.

Faye Leppla Secy to Daniel J. Schlue
Express Mail Label No. ER873481614US

TRANSMITTAL SHEET

Enclosed are the following documents:

Provisional Application Cover Sheet

Provisional Patent Application

Return Receipt Postcard

AUTHORIZATION TO CHARGE DEPOSIT ACCOUNT

The Director is hereby authorized to charge payment of any fees associated with this communication or credit any overpayment to Deposit Account No. 50-0959 (089498-0489).

Respectfully submitted

Daniel J. Schlue, Reg. No. 52,194
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222 South Main St.
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(330) 376-2700

Attorney for Applicant

February 12, 2004

089498-0489 / 1145086_1

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The University of Akron
DISCLOSURE OF INVENTION FORM

(UARF07 6/02)

Date: 8/11/03 8/12/03

Disclosure No.: 489 (University to provide)

1. Name and mailing address of individual submitting Disclosure.
DARRELL H. RENEKER / 1113 Goodyear Polymer Center, U. Akron

2. Official title or position of submitter.
Professor

3. Business telephone number of submitter.

4. Title or brief description of the invention.
Stent coating

5. Grant Award or Contract Number under which the work was done leading to the invention.
—

6. Specify if the invention resulted from:
   (a) ☑ University-supported effort.
   (b) ☐ Independent effort.
   (c) ☐ Outside activity/consulting agreement work.

7. Name and address of the facility within the University at which the invention was made.

8. If 6(b) and/or 6(c) above were checked, state the name and address of the facility at which the invention was made.

9. If 6(c) above was checked, provide pertinent *Outside Activity Report* form.

10. If 6(c) above was checked, provide a copy of the *Consulting Agreement* applicable to such invention as disclosed.

11. Contributions.
   (a) Full name (including full middle name), home address, and citizenship of those who contributed to the initial concept.

Name Daniel V. Smith Citizen of USA
Address Knight Hall

Name — Citizen of —
Address —

Name Woraphon Katapheran Citizen of Thailand
Address Goodyear Polymer Center, U. Akron

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(b) Full name (including full middle name), home address, and citizenship of those who contributed to subsequent development and testing.

Name _____ Citizen of _____

Address _____

Name _____ Citizen of _____

Address _____

Name _____ Citizen of _____

Address _____

12. Conception of discovery or invention.

(a) What was the problem and how did you attack it? Durable coating for stent

(b) First oral disclosure:

Date _____ To whom _____

(c) First drawings:

Date _____ Dwg. numbers See Figures 1-10 attached

* *attach two copies of the drawings to this form*

(d) First written description:

Date 8/12/03 Shown to or read by whom Ken Preston, Cheryl Garcia

* *attach two copies of the written description to this form*

13. Development of invention.

(a) Date work on development begun: Wrapping of nanofibers onto a stent

(b) Date completed: is described in UA 350

(c) By whom made? This work was undertaken by Reuben & Kataphenan in late July

(d) Experimental model ☐ Prototype ☐ early august, 2003

14. First successful test or operation.

(a) Date of first successful test or operation: _____

(b) By whom was the test conducted? _____

(c) Where are the records of the test? _____

(d) Who witnessed the records of the test? _____

15. First disclosure OUTSIDE the University.

(a) Was the discovery disclosed to anyone outside the University or published in any manner?

Yes ☐ No ☑

(b) Dates: _____

(c) To whom made? _____

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(d) Where was the disclosure made? (provide details)

____

____

16. First commercial use or sale.

(a) Was the invention used, given, or advertised for sale or sold to anyone outside the University?

Yes ☐ No ☑

(b) Dates ____________________

(c) Provide details of the use, sale, or offer for sale ____________________

Nanofibers were electrospun into a liquid which was caused to flow through holes in the wall of the stent in such a way that the fibers were wrapped around the metal wires of the stent. This provided a porous coating that is mechanically attached to the stent

17. Description of discovery.
It is essential to include:

(a) background information on the purpose of the discovery (*i.e.*, the problem to be solved); and

(b) a detailed description of the discovery or invention (*i.e.*, the solution to the problem) with drawings where possible; and

(c) a discussion of the advantages of the discovery or invention over what was done before.

Be certain to describe the best way of practicing the discovery or invention, and the alternatives to the best way without losing the advantages of the discovery or invention.

18. Most closely related prior publications, prior patents, and prior products or uses.

UA 356, UA357

See figs 6, 8, 9, 10 which show fibers on an ~~[illegible]~~ electron microscope grid.

19. Signature(s) of contributor(s).

(1)	__________	Date	______
(2)	__________	Date	______
(3)	__________	Date	______
(4)	__________	Date	______
(5)	__________	Date	______
(6)	__________	Date	______

The foregoing Invention Disclosure consisting of ☐ pages (attached) plus attachments was read and understood by me on the date opposite my name.

Witness(es): include Dean and/or Chair.

(1)	__________	Date	______
(2)	__________	Date	______

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and held in place after the stent is installed. ~~Either~~ Both the inside and the outside could be coated with layers of fibers that were securely attached to the stent and remained in place during expansion and after withdrawal of the balloon catheter

20. Please indicate if your invention falls under any or the following categories:

- ☐ 01 Agricultural chemical (fertilizers, pesticides)
- ☐ 02 Computers, data transmission, communications
- ☐ 03 Drugs (human and animal medicinal products)
- ☐ 04 Electrical and electronic equipment (transmission, industrial apparatus; household appliances; security, safety and warning alarms; video and sound reproduction)
- ☐ 05 Energy (generation, distribution, and controls)
- ☐ 06 Food products and processing
- ☐ 07 Industrial inorganic chemical products and processing
- ☐ 08 Industrial organic chemical products and processing (synthetic, coal, bio- and petro-chemicals)
- ☐ 09 Instruments, devices, controls, and systems
- ☐ 10 Mechanical machinery and equipment (construction, manufacturing, air conditioning, heat exchangers, vending machines, tools)
- ☐ 11 Medical, surgical, dental instruments (devices and supplies)
- ☐ 12 Metals (smelting, refining, steelmaking, processing)
- ☐ 13 Mining and extraction (minerals, metals, coal, gas, oil)
- ☐ 14 Packaging, graphics, printing
- ☐ 15 Paints, varnishes, coatings, adhesives
- ☐ 16 Petroleum refining, products, and processing
- ☐ 17 Photographic devices, optical instruments, and lenses
- ☐ 18 Plastics (resins, processes, equipment)
- ☐ 19 Pollution controls (gas, liquid, solid)
- ☐ 20 Pulp and paper, wood products, and processing
- ☐ 21 Rubber and plastic products, and processing
- ☐ 22 Soaps, detergents, cosmetics, toiletries
- ☐ 23 Stone, glass, clay products, and processing
- ☐ 24 Synthetic fibers (fiber production, processing, raw materials)
- ☐ 25 Textile products and processing
- ☐ 26 Transportation and lifting equipment (motor vehicles, aircraft and space, railroad, ships, hoists, conveyors)
- ☐ 27 Other

21. Do not submit this form unless it bears the **original** signatures of all contributors and witnesses.
22. After obtaining all required signatures, send the original *Disclosure of Invention*, with all attachments, to the Office of Research Services and Sponsored Programs, Polsky Bldg. Room 284, +2102.

UARF07 6/02

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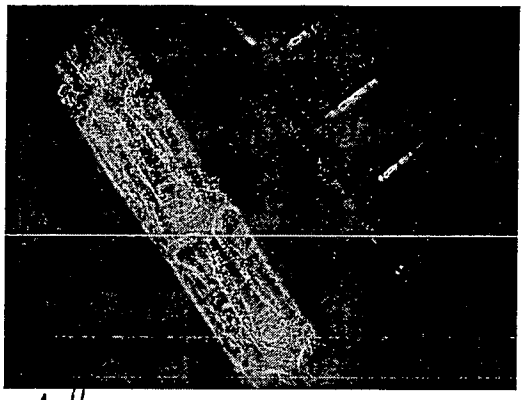
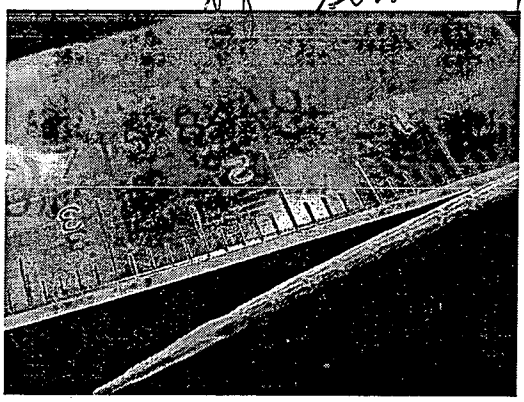
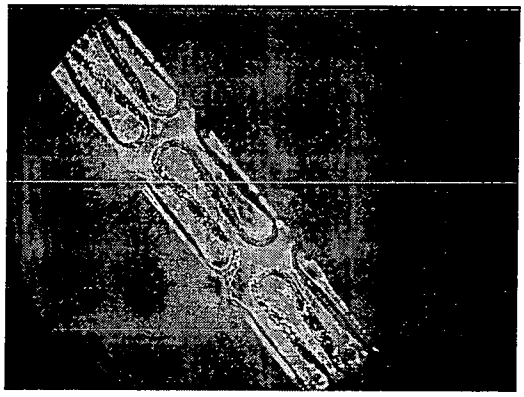
Figs. 1-4 show elastic fibers wrapped around a stent. The fibers covered the holes both before and after the stent was expanded.



Balloon before coating

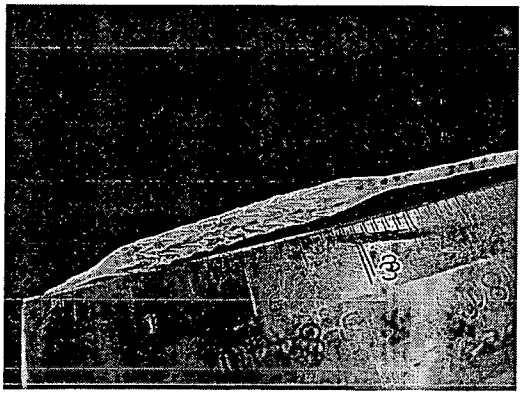
(2) a, b

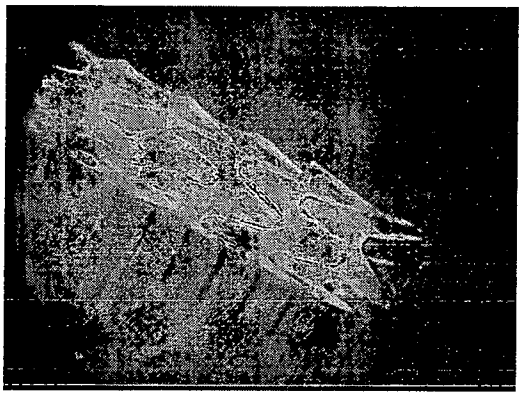




Balloon after coating with polyurethane electrospun fibers before inflating

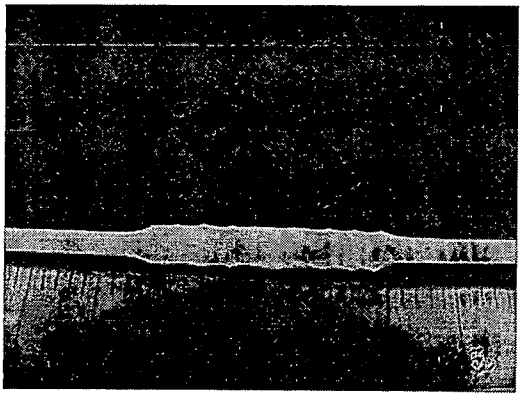
(3) a, b

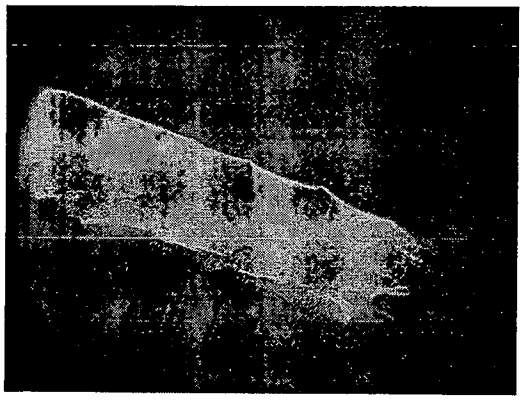




The inflated balloon after coating with polyurethane electrospun fibers.

(4) a, b





The coating expanded wire was removed form the inflated balloon and coated more with polyurethane electrospun fibers.

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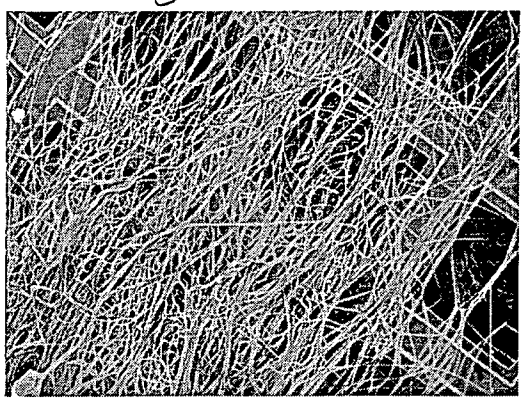
8/12/03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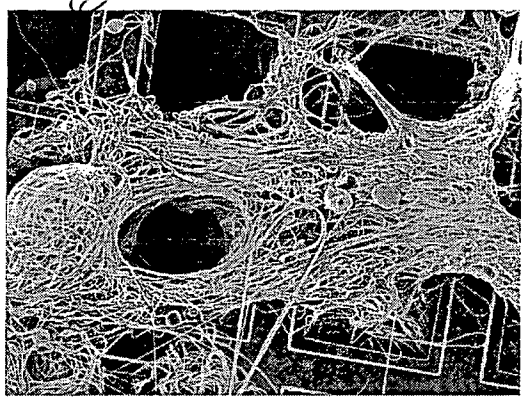
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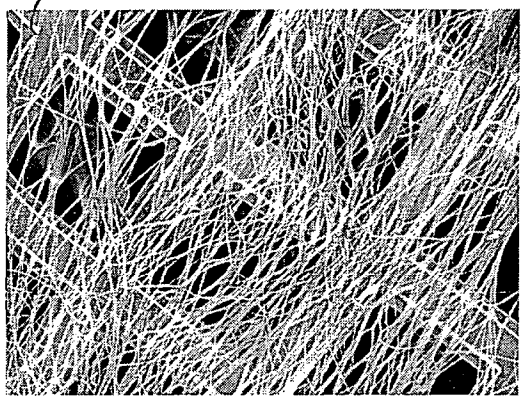
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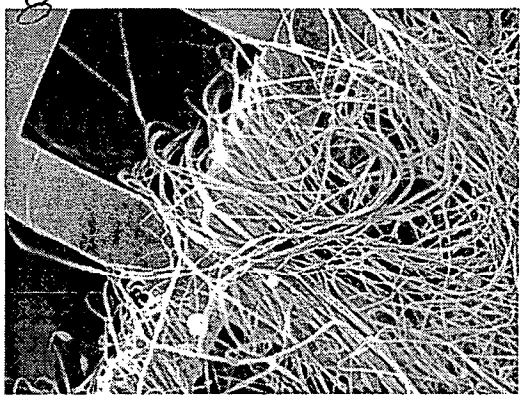
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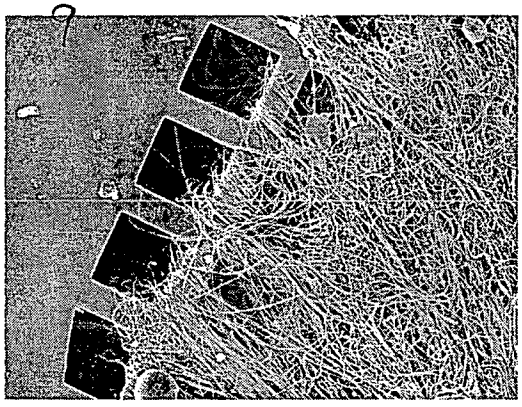
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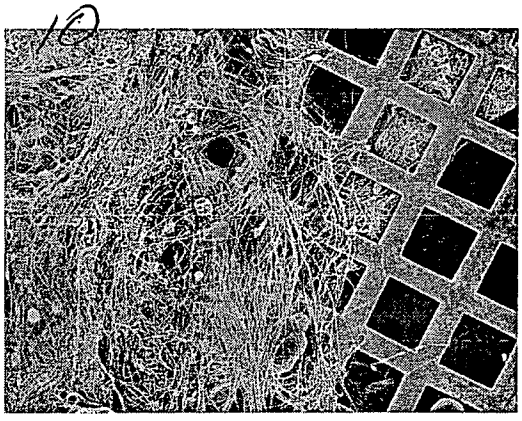
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Figs 5 and 7 show nanofibers on one side of a grid with 70 micron square holes.

Figs 6, 8, 9, 10 show fibers passing through holes in the grid and wrapping around the metal bars. Different flow patterns produced circular holes, looser or tighter wrapping and more or less material on the "inlet" or "outlet" side of the grid.

UA.489 Claims

1. An apparatus comprising:

a fibrous coating wherein at least one fiber is threaded through an orifice in an apparatus wall.

2. The apparatus of claim 1, wherein the at least one fiber is a nanofiber.

3. The apparatus of claim 1, wherein the fibrous coating is mechanically attached to an apparatus wall.

4. The apparatus of claim 3, wherein the fibrous coating is mechanically attached to an apparatus wall by being woven into the apparatus wall.

5. The apparatus of claim 1, wherein the apparatus is a stent or surgical mesh and the apparatus wall is a stent wall or a surgical-mesh wall.

6. A method for forming an apparatus having a fibrous coating comprising the step of:

threading a fiber through an orifice in an apparatus wall.

7. The method of claim 6, wherein the fiber is a nanofiber.

8. The method of claim 6, wherein the step of threading a fiber through an orifice in an apparatus wall is performed by:

adding at least one fiber to a fluid to thereby form a fiber-fluid solution; and

passing the fiber-fluid solution through at least one orifice in an apparatus wall so that the fiber is threaded by the fluid into the at least one orifice in the apparatus wall.

9. The method of claim 6, wherein the apparatus is a stent or surgical mesh and the apparatus wall is a stent wall or a surgical-mesh wall.

10. A method for using the apparatus of claim 1, comprising the step of:

inserting the apparatus into an organism.